

## International Virtual Observatory Alliance Guidelines for Participation

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### The VO Vision

The Virtual Observatory will be a system that allows astronomers to interrogate multiple data centers in a seamless and transparent way, which provides new powerful analysis and visualization tools within that system, and which gives data centers a standard framework for publishing and delivering services using their data. This is made possible by standardization of data and metadata, by standardization of data exchange methods, and by the use of a registry, which lists available services and what can be done with them.

The long term vision is not one of a fixed specific software package, but rather one of a *framework* which enables data centers to provide competing and co-operating *data services*, and which enables software providers to offer a variety of compatible *analysis and visualization tools* and *user interfaces*. The **first priority** for the VO projects worldwide is to develop the standardized framework, which will allow such creative diversity.

### The Advantages and Costs of VO Participation

As the capabilities of international astronomical research are being expanded via new and expensive multi-wavelength capabilities on the ground and in space, there is an increasing awareness on the behalf of scientists and funding bodies of the need to maximize the scientific return on these significant investments and provide a data heritage. Data must be captured, described, processed and stored in such a way that it can be reutilized by future generations of researchers and by programs with scientific goals that may differ from those that originally sought the data. Taking data, describing data, processing data, and storing in such a way that it can be reused, comes at a cost. These costs will perhaps include fundamental changes in way observatories are designed and operated. The VO is the critical infrastructure that will enable astronomers to fully realize the returns on an investment in data heritage. There are numerous advantages to participation in the VO, including increased visibility and usage of a project's or organization's data and facilities, and thereby increased recognition and support. VO participation is a lever arm, raising the standards for data quality and leading to better-quality astronomical research worldwide. VO participation also provides access to world-class data for scientists in less advantaged countries, by allowing for in-kind contributions from groups with, for example, software expertise rather than large telescopes.

## **The IVOA Mission**

The International Virtual Observatory Alliance (IVOA) was formed in June 2002 during the conference *Towards an International Virtual Observatory* held in Garching, Germany. The mission of the IVOA is

“To facilitate the international coordination and collaboration necessary for the development and deployment of the tools, systems, and organizational structures necessary to enable the international utilization of astronomical archives as an integrated and interoperating Virtual Observatory.”

The IVOA is not itself a project, but rather a forum for increasing cooperation on technical and programmatic issues facing the development and operation of an International Virtual Observatory. The founding principles of the IVOA are further elucidated at <http://www.ivoa.net>.

## **The IVOA Process**

The IVOA has defined a commonly agreed roadmap of developments over the next three years. In this critical and highly formative period for the VO, the main infrastructure components of the VO will be defined, prototyped, and deployed via periodic demonstrations of new capabilities. It is essential that the collective resources of the IVOA partners be utilized to ensure the success of these developments and to provide the fundamental common framework of standards and systems necessary for the VO to work on an international scale. Once this framework is in place, the doors will be open to a wide range of new tool development and new scientific investigations.

IVOA collaboration is being realized by annual international meetings, workshops, international telephone conferencing, the extensive use of intranet technologies at project web sites, and active e-mail groups on particular topics. The IVOA will also work closely with the IAU (in particular Commission 5) to ensure that emerging standards for the VO are assessed and adopted at the level appropriate to their significance for international astronomy.

## **IVOA Membership**

All funded international VO projects are welcome to join the IVOA. Each member project will have representation on the IVOA executive committee. There is, however, more to becoming a contributing partner in the IVOA than simply joining an e-mail distribution list. IVOA participating organizations are expected to

- have serious VO development efforts;
- support full and open exchange of technical developments, including software sharing;

- participate in the definition and evaluation of emerging VO standards and protocols, and once such standards and protocols are agreed upon, to implement VO-compliant interfaces to data, catalogs, and computational services;
- support open access to data and information services, commensurate with national or project-imposed proprietary periods;
- document data and information services according to VO-defined data quality descriptions; and
- register data and information services so that they can be discovered and utilized readily in the VO.

These expectations are not intended to be onerous; rather, they reflect the responsibilities associated with the acquisition, processing, and publication of data acquired with modern astronomical instruments, especially those funded through public resources.

The IVOA encourages observatories, universities, and astronomy projects worldwide to become involved in the VO as data, information, and computational service providers, and as consumers of the enriched, multi-wavelength view of the universe. In order for astronomers, educators, and the public to make effective use of the IVO, however, its holdings must be well-documented and must be delivered to users in the agreed upon formats and protocols. Participation in the VO is both a privilege and a responsibility.

